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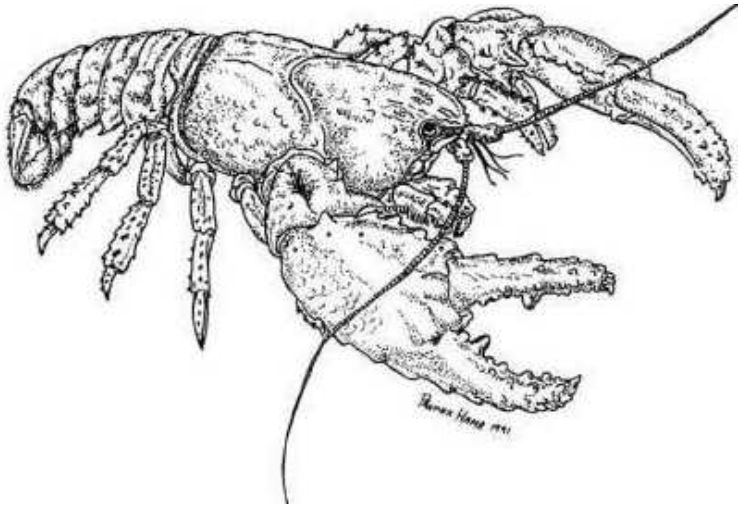

Tasmania's Only Tree Orchid – Threatened?

by **Ian Ferris and Philip Milner**
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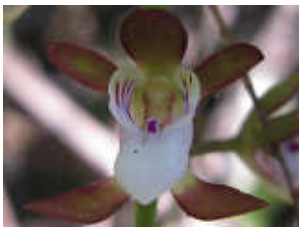
Mature tree orchid specimen with multiple flowering racemes

Typical appearance

The only Tasmanian species of arboreal orchid, Gunn's tree orchid *Sarcochilus australis*, is described as being widely distributed throughout the low to middle altitudes up to approximately 600m, in most coastal areas throughout the state north of about Freycinet. It generally occurs in shady, moist, riparian areas, as it appears to be sensitive to solar radiation and desiccation, and is intolerant of fire. It is described in literature from the mainland of Australia (it also occurs in near coastal areas from Victoria into southern Queensland) as a 'twig epiphyte', in that it grows mainly on branches or tree

trunks as opposed to other arboreal orchids that nestle in cracks and hollows or joins – to take advantage of collected leaf and bark accumulations.

Twig orchids survive by clinging onto the bark of trees, and are not parasitic, but are epiphytic, in that they do not rely on nutrient from their host but obtain water and nutrient from the moisture and dust that flows around them. Subsequently they often have quite extensive root systems. They do not have a tuber or bulb for moisture storage, as do many terrestrial orchids; the name orchid derives from 'orchis', Greek for 'testicle' from the shape of the tuber of many orchids but these are exceptions.


Flower detail

The flowers are perfumed, and attract native bees for pollination. They also distribute their seeds aerially, from a surprisingly large seed capsule, and this can result in quite rapid spread of the plant into the surrounding area. In general for *Sarcochilus a.*, it is common to find clusters of plants within a 50-100m radius, within the preferred damp/shady habitat they prefer. Obviously that criteria means that they will extend upstream or downstream in a narrow riparian zone, rather than laterally into the drier, less shady and often higher elevation slopes.

The anecdotal generalisations that relate to *Sarcochilus a.* are mostly centred on the species of tree that they prefer. Most people familiar with the species will look closely for it on Dogwood, *Pomaderris apetala* and especially if it is associated with Native currant *Coprosma quadrifida*, as these appear to be a favoured host. Is this valid?

Examination of a number of occurrences in the north and northwest of Tasmania, and reference to the limited literature on this species has found that there is a wide range of species that *Sarcochilus a.* will colonise, but there is a distinct preference. This may relate to bark type and habitat rather than species.


Seed capsule

Sarcochilus a. has a tiny seed that issues from a quite large seed capsule, similar to a pea pod in appearance, the dimensions of which relate to the plant size. Larger plants that occur in the wetter areas, such as the Sumac south of Smithton, can have capsules 6cm long, whereas the smaller plants in drier areas have capsules of less than 2 cm. The capsules split lengthways when ready, and the many thousands of light seeds float about on release to be caught by chance on appropriate substrates.


Seedlings

It would be intuitively expected that seeds would be preferentially caught on coarser barked species, as opposed to smooth barks, for simple physical reasons. Orchid seeds require a suitable substrate, containing quite specific biological associations, before they can germinate. A tiny seed would seem to need something to catch and hold onto, prior to being able to react with whatever might be at the site that it can react with. Coarser barks would be logical and sensible. However, nature does not seem to operate with our logic.

Our observations and research have indicated, for *Sarcochilus a.*:

- A clear preference for riparian sites, but this is definitely not exclusive. Occurrences have been located that are hundreds of metres away from creek lines, or on the sides of steep slopes, albeit in very moist areas. Specimens have been located within a few metres of tidal water.
- It is unusual, but not impossible, to find just one specimen. If you find

one, you will very probably find others nearby.
- Plants that are in very moist locations are likely to be significantly more robust and more likely to flower than plants in drier areas. This is well illustrated by the small plants in an occurrence near Port Sorell, compared to those in the Tarkine, which are very robust.
- A distinct preference for smooth barked trees, and certainly for trees that are not pyrophyllic (e.g. most of the eucalypts) - these orchids appear to be intolerant of fire. However, several specimens have been found growing on rough barked trees, such as Bursaria spinosa Prickly Box and even on *Melaleuca squarrosa* with papery bark. The species that have been observed and recorded to host this orchid include:
    - †*Acacia melanoxylon* Blackwood
    - *Anodopetalum biglandulosum* Horizontal
    - #†*Bursaria spinosa* Prickly Box
    - #*Beyeria viscosa* Pinkwood
    - #*Coprosma quadrifida* Native Currant
    - *Correa backhouseana* Velvet Correa
    - #*Eucryphia lucida* Leatherwood
    - #†*Melaleuca ericifolia* Swamp Paperbark
    - #†*Melaleuca squarrosa* Sweet Scented Paperbark
    - *Nematolepis squamea* Satinwood
    - #†*Olearia argophylla* Musk
    - #*Pomaderris apetala* Dogwood
    - #*Zieria arborescens* Stinkwood
      (Those marked '#' are supported by our own observations) Of these, almost all have smooth bark. The rough or papery barked species are marked with '†'.

Of course, what appears to us as smooth might be very rough in texture at the micro level. The seeds are tiny, about 0.5 millimetre or less, and have the ability to float in a light breeze as they have tiny 'wings'.

- A favoured location is within a height of between 1.5 m and 3 m off the ground, although heights of 45 metres is not uncommon. Higher location is obviously more efficient, giving greater seed dispersal, but the penalty for the plant is lower humidity. Specimens in the Tarkine region appeared to be generally higher than those in drier country. Some of this might be due to that serious threat, the orchid collector, but the observation holds for isolated occurrences.
- A preference for mossy trees, at least for established specimens. The trees that are old enough to have a thin moss covering, usually *Pomaderis* sp., appear to promote preferential growth, although this often results in plants falling off their host during high winds (or drying out) as they are not tightly rooted onto the branch, but just onto the moss and collected detritus. It may be that the moss grows AFTER the orchid has developed from the original seed. Moss would assist the orchid's moisture retention, and the orchid roots collect moss and debris.

- The plants that are observed growing in *C. quadrifida* are possibly the result of these falls, rather than colonisation. Few plants have been observed growing on the trunk of *Coprosma* sp., mostly they are in the branches. Most of these specimens are depauperate, i.e. thin and gangly, and are unlikely to be successful. It was conjectured that many of these plants are the result of falls of immature plants that have been unable to remain tied onto their original root site, and *Coprosma*, being a common, prickly understorey associate of *Pomaderis* sp., is a common recipient. However very small plants have been observed growing on *Coprosma* sp.
- In some areas there are frequent orchid specimens on the ground, and these will not survive. In addition there are specimens found, not uncommonly, on dead branches and trees. These will also not survive,

especially the first hint of fire that may sweep through, or from host fall.

- Smith 2008[1] determined that the fruiting rate for *Sarcochilus* in Tasmania, that is, the rate of fruiting capsules to flower racemes, is less than 1%, and many old plants have no seed pods or capsule remnants. This indicates that the seed pod must have a high number of seed (it does, millions), for the plant to survive as a species. The rate of successful attachment and germination also appears to be low, based on an example of germinations sighted on a single branch of *Ziera arborescens*, and subsequent attrition from falls, dislodgement, predation, death of host, and exposure to light must be very high.
- Tremblay 2006[2] postulated a link between flowering and length of leaves of *Sarcochilus a.*, in that plants with leaf length less than 80mm have a low chance of flowering. As length (and number) of leaves is clearly related to moisture level at the site, and to the particular location on the host tree, moisture (rainfall pattern, humidity, etc) will effect a plant's future survival. Climate changes, where the east Coast of Tasmania is becoming drier, will have an effect on the population and distribution of this orchid.
- The habitat for *Sarcochilus a.* is restricted by moisture and canopy cover. It poorly tolerates bright sunlight or extended drying out periods – it has, unlike many terrestrial orchids, no tuber to act as a moisture store, but uses its extensive root system as a storage. It is clear that riparian zones do retain moisture and usually have good canopy coverage, so they are suitable habitats. Other areas that also retain moisture and have high shade levels might also be suitable for these plants, but the potential for dispersion is lessened as the potential for drying out (and fire) is increased.

Sarcochilus a. is not listed as a threatened species. Unfortunately listing only occurs once a species is found to be under threat by a long process of deterioration in numbers, or loss of habitat. As it is not listed, it is also not monitored, so we do not know if this species is under threat. It is the loss of habitat that is the greatest threat to *Sarcochilus*, as the existing riparian zones so conducive to their existence are being threatened widely by forestry, urban spread and agriculture.

A second threat of unknown level is from collectors. Because the reproduction rate is low, and the area of suitable habitat limited and becoming more so, the loss of any healthy plant is potentially disastrous for the survival of the species in that location. Hearsay evidence is that these orchids are 'popular' as they survive when collected. However, they will most probably not be placed in a location that allows seed dispersion, so their reproduction capacity is lost. Millions of propagation opportunities are gone, for every stolen plant.

The impact of collectors – the plant is attractive, and is readily collected as it grows at low levels - should not be underestimated. Of course there is little factual data on theft of this (and many other) species. There is a risk that collection of location and count data by 'citizen scientists' although highly valuable and probably the only research being done, might result in occurrences being found and pillaged, as this data becomes publicly available. Examples of this are known.

In the 2008 survey by Smith, using a range of sources, a total of less than 1000 plants were counted for the entire state. Our approximations just in the north western portion of the state indicate about 300 specimens. Assuming that there are 10 times this number, there may be 3000 plants, many of them small, and most well separated from surrounding populations. According to Tremblay 2006, genetic sustainability for this plant requires about 50 plants per colony, but a “colony” might be very widespread.

Many cases of riparian zones being 'protected' have shown that inadequate

width of the zone is reserved leading to a failure to retain sufficient moisture - the zone needs to be quite wide to retain a suitably moist atmosphere. It is not sufficient to retain 3m or even 10m from the creek line, as this will lead to long term drying out of the zone and loss of orchid habitat.

The degree of clearing of the riparian zones in the coastal lowlands that form the habitat for this plant is well documented to be very high. Clearing for pivot irrigation, increases in dairy production, logging by clearfell and burn, and the regular burning for 'fuel reduction' in areas remote from population centres will all have a negative effect on *Sarcochilus a.*.

Climate change is well under way, and the frequency of fires and the decreases in the area of moist gullies and valleys where this plant could thrive may be a major threat to its survival. Significant losses of this species in Victoria's fires have been well documented, with the conclusion being that 'it is hoped that they may repopulate from surrounding areas' being the barely adequate solution.

This plant, Tasmania's only arboreal orchid, has limited numbers and a specialised habitat. We consider that its survival is under threat, not only from human activity, but human induced climate change.

References:
- [1]Smith, Tobias J. 'New Ecological Findings for Sarcochilus Australis, a Unique Orchid in Tasmania', *The Tasmanian Naturalist* 130 (2008)
- [2]Tremblay, Raymond L. 'The effect of population structure, plant size, herbivory and reproductive potential on effective population size in the temperate epiphytic orchid, *Sarcochilus australis*', *Cunninghamia* (2006) 9(4): 529–535
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Back to top

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Acoustic Bird Monitoring
Walks & events
Links